

Remarks

The above amendments and these remarks are responsive to the Office Action mailed July 27, 2005. With entry of this amendment, claims 1, 3-8, 10-15, 17-21, 23-26, 29-31, 33-36 are pending and claims 2, 9, 16, 22, 27, 28, and 32 are cancelled. No new matter has been added by these amendments.

Formal Matters

In an October 25, 2005 telephone interview, the Examiner stated that the same § 102 rejection that applies to claims 1-4, 7, 8, 11, 13-21, 23-26, 29, and 30, also should apply to claim 36. This response is prepared with this understanding.

Claim 3 is amended to correct a typographical error.

Claim 35 is amended to correct typographical errors.

Allowable Subject Matter

Applicants thank the Examiner for indicating that claims 9, 10, 12, 22, and 31-35 are allowable. As indicated below, where appropriate, these claims are amended into independent form, thus placing each claim in condition for allowance.

Claim 7 has been amended to incorporate the subject matter of claim 9, which is indicated to be allowable, thus placing independent claim 7 in condition for allowance. Furthermore, claims 8 and 10-14 are in condition for allowance because they depend from amended claim 7. Claim 9 is cancelled because it has the same scope as amended claim 7.

Claim 19 has been amended to incorporate the subject matter of claim 22, which is indicated to be allowable, thus placing independent claim 19 in condition for allowance. Furthermore, claims 20, 21, and 23-26 are in condition for allowance because they depend from amended claim 19. Claim 22 is cancelled because it has the same scope as amended claim 19.

Claim 29 has been amended to incorporate the subject matter of claim 32, which is indicated to be allowable, thus placing independent claim 29 in condition for allowance. Furthermore, claims 30, 31, 33, and 34 are in condition for allowance because they depend from amended claim 29. Claim 32 is cancelled because it has the same scope as amended claim 29.

It is noted that independent claim 35 is indicated to be allowable.

Rejections under 35 USC § 112

Claims 27 and 28 are cancelled without prejudice, thus rendering moot the rejection of those claims under 35 USC § 112.

Rejections under 35 USC § 102

Claims 1-4, 7, 8, 11, 13-21, 23-26, 29-30, and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Kato (US Pat. No. 5,947,095).

Before discussing Kato in detail, Applicants believe it may be helpful to review some background information. As described in Applicants' specification, cylinder air-fuel ratios may vary from cylinder to cylinder due to, for example, maldistribution, mixing, etc. As shown in Fig. 1 and described in the specification, one approach to correct such variation in an engine with

electrically actuated valves is to control air-fuel ratios in individual cylinders via control of the timing of the electrically actuated intake/exhaust valves. Accordingly, amended claim 1 recites:

A method to control air-fuel ratios in individual cylinders of an internal combustion engine with electrically actuated valves, where each electrically actuated valve is actuated directly by an electromagnetic actuator, the method comprising:

operating at least an electrically actuated valve in each cylinder combusting an air-fuel mixture during a cycle of said engine; and

correcting an air and fuel mixture supplied to each cylinder combusting an air-fuel mixture by adjusting electrically actuated valve timing for said each cylinder based on a desired air-fuel mixture in said each cylinder combusting an air-fuel mixture.

In this way, it is possible to control at least the air, and thus the air-fuel ratio, in each cylinder via the valve timing of electrically actuated valves (where each electrically actuated valve is actuated directly by an electromagnetic actuator), thereby achieving improved control.

Applicants respectfully submit that Kato fails to show all of the limitations of amended claim 1. For example, claim 1 recites “correcting an air and fuel mixture supplied to each cylinder combusting an air-fuel mixture by adjusting electrically actuated valve timing for said each cylinder based on a desired air-fuel mixture in said each cylinder combusting an air-fuel mixture.” Kato does not teach or suggest such an approach. Rather, Kato appears to rely solely on adjusting fuel injection to control air-fuel ratio. See, for example, column 6, lines 25-43 and lines 49-58; column 8, lines 8-21.

Further, claim 1 recites that “each electrically actuated valve is actuated directly by an electromagnetic actuator” (emphasis added). Kato does not teach or even suggest such an approach. To the contrary, Kato describes a changeover mechanism 60 that requires hydraulic pressure to change valve timing. See, for example, Col. 5, line 66 through Col. 6, line 6.

According to Kato, an electromagnetic actuator cannot directly control valve timing, because hydraulic pressure is required to directly control valve timing.

As explained above, Kato does not teach each and every aspect of claim 1, and therefore, Kato cannot anticipate claim 1. Accordingly, the rejection of claim 1 should be withdrawn. Claims 3-4 depend from claim 1, and rejection of those claims should be withdrawn for at least this reason. Claim 2 has been cancelled without prejudice, thus rendering moot rejection of that claim.

The above arguments also apply to amended claim 15, as well as claims 17 and 18, which depend from claim 15, and to amended claim 36. Accordingly, rejection of those claims should also be withdrawn.

As explained above, claims 7, 19, and 29 have been amended to incorporate allowable subject matter, thus rendering moot the rejection of these claims, as well as all claims depending from these claims.

Rejections under 35 USC § 103

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato. As described above, Kato does not disclose each and every element of independent claim 1, from which claims 5 and 6 depend. Accordingly, Kato alone cannot render claims 5 or 6 obvious.

Furthermore, the Examiner relies on Official Notice that it is known in the art to operate certain cylinders or banks of cylinders at different air/fuel ratios. Applicants object to the use of Official Notice. Specifically, Applicants disagree that operating certain cylinders or banks of cylinders at different air/fuel ratios is at all obvious, particularly in light of Kato's repeated

reliance on a single air/fuel ratio, thus demonstrating that there is a common air-fuel ratio for all cylinders. Furthermore, none of the cited art recognizes how to achieve individual cylinder air-fuel control utilizing electrically actuated valves. As such, Applicants respectfully request the rejection of claims 5 and 6 to be withdrawn for at least this additional reason.

Conclusion

Applicants thank the Examiner for carefully considering the subject application.

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is respectfully requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No.06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

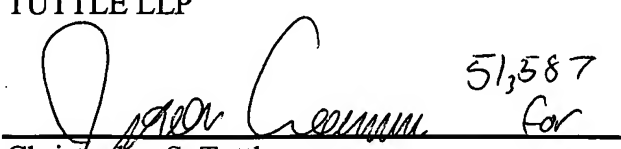
CERTIFICATE OF MAILING

I hereby certify that this correspondence is being sent via first class mail addressed to Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on October 26, 2005.


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Respectfully submitted,

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